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RAW SEQUENCE LISTING   DATE: 02/28/2002
PATENT APPLICATION: US/09/876,796B   TIME: 12:22:24

Input Set : A:\Rb125seq.txt
Output Set: N:\CRF3\02282002\I876796B.raw

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  3 <110> APPLICANT: Horwath, K. L. ,Easton, C. M. , and Myers, K. L.
  5 <120> TITLE OF INVENTION: Nucleic Acid Sequences Encoding Type III Tenebrio
  6       Antifreeze Proteins and Method for Assaying Activity.
  8 <130> FILE REFERENCE: RB-125-PCT
C--> 10 <140> CURRENT APPLICATION NUMBER: US/09/876,796B
C--> 11 <141> CURRENT FILING DATE: 2001-08-08
 13 <150> PRIOR APPLICATION NUMBER: US 60/210,446
 14 <151> PRIOR FILING DATE: 2000-06-08
 16 <160> NUMBER OF SEQ ID NOS: 48
 18 <170> SOFTWARE: Microsoft Word
 20 <210> SEQ ID NO: 1
 21 <211> LENGTH: 19
 22 <212> TYPE: PRT
 23 <213> ORGANISM: Tenebrio molitor
 25 <223> OTHER INFORMATION: N-terminal sequence of protein Tm 12.86
 27 <400> SEQUENCE: 1
 28 Leu Thr Asp Glu Gln Ile Gln Lys Arg Asn Lys Ile Ser Lys Glu Cys
 29 1               5                   10                  15
 31 Gln Gln Val
 32         19
 34 <210> SEQ ID NO: 2
 35 <211> LENGTH: 576
 36 <212> TYPE: DNA
 37 <213> ORGANISM: Tenebrio molitor
 39 <223> OTHER INFORMATION: Non-his-tagged, signal plus, Tm 13.17
 41 <400> SEQUENCE: 2
 42 gtggatccaa agaattcggc acgagactac taag atg aag ttg ctc         46
 43                                       Met Lys Leu Leu
 44                                                     -15
 46 tgt tgt cta atc tcc ctc att ctg ttg gtc aca gtt cag gcc ctg     91
 47 Cys Cys Leu Ile Ser Leu Ile Leu Leu Val Thr Val Gln Ala Leu
 48              -10                 -5                  1
 50 acc gag gca caa att gag aaa ctg aac aag atc agc aaa aaa tgt    136
 51 Thr Glu Ala Gln Ile Glu Lys Leu Asn Lys Ile Ser Lys Lys Cys
 52              5                   10                  15
 54 caa aat gaa agt gga gtg tcg caa gag atc ata acc aaa gct cgc    181
 55 Gln Asn Glu Ser Gly Val Ser Gln Glu Ile Ile Thr Lys Ala Arg
 56              20                  25                  30
 58 aac ggt gac tgg gag gac gat cct aaa ctg aaa cgc caa gtt ttt    226
 59 Asn Gly Asp Trp Glu Asp Asp Pro Lys Leu Lys Arg Gln Val Phe
 60              35                  40                  45
 62 tgc gtg gcc agg aac gcc ggt ctg gcc acg gaa tcg gga gag gtg    271
 63 Cys Val Ala Arg Asn Ala Gly Leu Ala Thr Glu Ser Gly Glu Val
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Input Set : A:\Rb125seq.txt
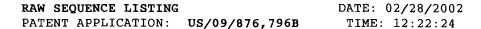Output Set: N:\CRF3\02282002\I876796B.raw

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64            50              55              60
66 gtg gtc gac gtg ttg agg gag aag gtg agg aag gtc act gac aac      316
67 Val Val Asp Val Leu Arg Glu Lys Val Arg Lys Val Thr Asp Asn
68            65              70              75
70 gac gaa gaa act gag aaa atc atc aat aag tgc gcc gtc aag aga      361
71 Asp Glu Glu Thr Glu Lys Ile Ile Asn Lys Cys Ala Val Lys Arg
72            80              85              90
74 gat act gtt gaa gag acg gtg ttc aat act ttc aaa tgt gtc atg      406
75 Asp Thr Val Glu Glu Thr Val Phe Asn Thr Phe Lys Cys Val Met
76            95              100             105
78 aaa aac aag cca aag ttc tca cca gtt gat tga accaccacga          449
79 Lys Asn Lys Pro Lys Phe Ser Pro Val Asp
80            110             115
82 ctagtagatg gttcaaatgg tgtgctttac atataaaat aaagtgtttc           499
84 tgatgtaaaa aaaaaaaaaa aaaaaaaaaa aactcgagag tattctagag          549
86 cggccgcggg cccatcgttt tccaccc                                   576
89 <210> SEQ ID NO: 3
90 <211> LENGTH: 134
91 <212> TYPE: PRT
92 <213> ORGANISM: Tenebrio molitor
94 <223> OTHER INFORMATION: Precursor Protein for Tm 13.17
96 <400> SEQUENCE: 3
97 Met Lys Leu Leu Cys Cys Leu Ile Ser Leu Ile Leu Leu Val Thr Val
98            -15             -10             -5
100 Gln Ala Leu Thr Glu Ala Gln Ile Glu Lys Leu Asn Lys Ile Ser Lys
101           1               5               10
103 Lys Cys Gln Asn Glu Ser Gly Val Ser Gln Glu Ile Ile Thr Lys Ala
104 15                20              25              30
106 Arg Asn Gly Asp Trp Glu Asp Asp Pro Lys Leu Lys Arg Gln Val Phe
107           35              40              45
109 Cys Val Ala Arg Asn Ala Gly Leu Ala Thr Glu Ser Gly Glu Val Val
110           50              55              60
112 Val Asp Val Leu Arg Glu Lys Val Arg Lys Val Thr Asp Asn Asp Glu
113           65              70              75
115 Glu Thr Glu Lys Ile Ile Asn Lys Cys Ala Val Lys Arg Asp Thr Val
116       80              85              90
118 Glu Glu Thr Val Phe Asn Thr Phe Lys Cys Val Met Lys Asn Lys Pro
119 95                100             105             110
121 Lys Phe Ser Pro Val Asp
122           115
125 <210> SEQ ID NO: 4
126 <211> LENGTH: 116
127 <212> TYPE: PRT
128 <213> ORGANISM: Tenebrio molitor
130 <223> OTHER INFORMATION: Mature Protein for Tm 13.17
132 <400> SEQUENCE: 4
133 Leu Thr Glu Ala Gln Ile Glu Lys Leu Asn Lys Ile Ser Lys Lys Cys
134 1             5               10              15
136 Gln Asn Glu Ser Gly Val Ser Gln Glu Ile Ile Thr Lys Ala Arg Asn
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Input Set : A:\Rb125seq.txt
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137              20               25               30
139 Gly Asp Trp Glu Asp Asp Pro Lys Leu Lys Arg Gln Val Phe Cys Val
140          35               40               45
142 Ala Arg Asn Ala Gly Leu Ala Thr Glu Ser Gly Glu Val Val Val Asp
143      50               55               60
145 Val Leu Arg Glu Lys Val Arg Lys Val Thr Asp Asn Asp Glu Glu Thr
146 65               70               75               80
148 Glu Lys Ile Ile Asn Lys Cys Ala Val Lys Arg Asp Thr Val Glu Glu
149              85               90               95
151 Thr Val Phe Asn Thr Phe Lys Cys Val Met Lys Asn Lys Pro Lys Phe
152              100              105              110
154 Ser Pro Val Asp
155          115
158 <210> SEQ ID NO: 5
159 <211> LENGTH: 481
160 <212> TYPE: DNA
161 <213> ORGANISM: Tenebrio molitor
163 <223> OTHER INFORMATION: Non-His-tagged, Signal plus, Clone 2.2
165 <400> SEQUENCE: 5
166 ggcacgagca aaa atg aaa ctc ctc ttg tgc ttt gcg ttc gcc gcc     46
167                 Met Lys Leu Leu Leu Cys Phe Ala Phe Ala Ala
168                      -15               -10
170 atc gtc atc gga gct cag gct ctc acc gac gaa cag ata cag aaa     91
171 Ile Val Ile Gly Ala Gln Ala Leu Thr Asp Glu Gln Ile Gln Lys
172          -5                1                5
174 agg aac aag atc agc aaa gaa tgc cag cag gtg tcc gga gtg tcc     136
175 Arg Asn Lys Ile Ser Lys Glu Cys Gln Gln Val Ser Gly Val Ser
176      10               15               20
178 caa gag acg atc gac aaa gtc cgc aca ggt gtc ttg gtc gat gat     181
179 Gln Glu Thr Ile Asp Lys Val Arg Thr Gly Val Leu Val Asp Asp
180      25               30               35
182 ccc aaa atg aag aag cac gtc ctc tgc ttc tcg aag aaa act gga     226
183 Pro Lys Met Lys Lys His Val Leu Cys Phe Ser Lys Lys Thr Gly
184      40               45               50
186 gtg gca acc gaa gcc gga gac acc aat gtg gag gta ctc aaa gcc     271
187 Val Ala Thr Glu Ala Gly Asp Thr Asn Val Glu Val Leu Lys Ala
188      55               60               65
190 aag ctg aag cat gtg gcc agc gac gaa gag gtg gac aag atc gtg     316
191 Lys Leu Lys His Val Ala Ser Asp Glu Glu Val Asp Lys Ile Val
192      70               75               80
194 cag aag tgc gtg gtc aag aag gcc aca cca gag gaa acg gct tat     361
195 Gln Lys Cys Val Val Lys Lys Ala Thr Pro Glu Glu Thr Ala Tyr
196      85               90               95
198 gac acc ttc aag tgt att tac gac agt aaa cct gat ttc tct cct     406
199 Asp Thr Phe Lys Cys Ile Tyr Asp Ser Lys Pro Asp Phe Ser Pro
200      100              105              110
202 att gat taa ttgttttgta tttgactgaa ttttgacaat aaaggtaata     455
203 Ile Asp
204      115
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206 tcgttatgta aaaaaaaaaa aaaaaa                               481
209 <210> SEQ ID NO: 6
210 <211> LENGTH: 482
211 <212> TYPE: DNA
212 <213> ORGANISM: Tenebrio molitor
214 <223> OTHER INFORMATION: Non-His-tagged, Signal plus, Clone 2.3
216 <400> SEQUENCE: 6
217 ggcacgagca aaa atg aaa ctc ctc ttg tgc ttt gct ttc gcc gcc    46
218             Met Lys Leu Leu Leu Cys Phe Ala Phe Ala Ala
219                     -15                     -10
221 atc gtc atc gga gct cag gct ctc acc gac gaa cag ata cag aaa    91
222 Ile Val Ile Gly Ala Gln Ala Leu Thr Asp Glu Gln Ile Gln Lys
223         -5              1               5
225 agg aac aag atc agc aaa gaa tgc cag cag gtg tcc gga gtg tcc   136
226 Arg Asn Lys Ile Ser Lys Glu Cys Gln Gln Val Ser Gly Val Ser
227     10              15              20
229 caa gag acg atc gac aaa gtc cgc aca ggt gtc ttg gtc gac gat   181
230 Gln Glu Thr Ile Asp Lys Val Arg Thr Gly Val Leu Val Asp Asp
231     25              30              35
233 ccc aaa atg aag aag cac gtc ctc tgc ttc tcg aag aaa act gga   226
234 Pro Lys Met Lys Lys His Val Leu Cys Phe Ser Lys Lys Thr Gly
235     40              45              50
237 gtg gca acc gaa gcc gga gac acc aat gtg gag gta ctc aaa gcc   271
238 Val Ala Thr Glu Ala Gly Asp Thr Asn Val Glu Val Leu Lys Ala
239     55              60              65
241 aag ctg aag cat gtg gcc agc gac gaa gaa gtg gac aag atc gtg   316
242 Lys Leu Lys His Val Ala Ser Asp Glu Glu Val Asp Lys Ile Val
243     70              75              80
245 cag aag tgc gtg gtc aag aag gcc aca cca gag gaa acg gct tat   361
246 Gln Lys Cys Val Val Lys Lys Ala Thr Pro Glu Glu Thr Ala Tyr
247     85              90              95
249 gac acc ttc aag tgt att tac gac agt aaa cct gat ttc tct cct   406
250 Asp Thr Phe Lys Cys Ile Tyr Asp Ser Lys Pro Asp Phe Ser Pro
251     100             105             110
252 att gat taa ttgttttgta tttgactgaa ttttgacaat aaaggtacta      455
253 Ile Asp
254     115
256 tcgttatgaa aaaaaaaaaa aaaaaaa                               482
259 <210> SEQ ID NO: 7
260 <211> LENGTH: 133
261 <212> TYPE: PRT
262 <213> ORGANISM: Tenebrio molitor
264 <223> OTHER INFORMATION: Precursor Protein for Tm 12.84, Clones 2.2, 2.3, and 7.5
266 <400> SEQUENCE: 7
267 Met Lys Leu Leu Leu Cys Phe Ala Phe Ala Ala Ile Val Ile Gly Ala
268             -15                     -10                     -5
270 Gln Ala Leu Thr Asp Glu Gln Ile Gln Lys Arg Asn Lys Ile Ser Lys
271         1               5                       10
273 Glu Cys Gln Gln Val Ser Gly Val Ser Gln Glu Thr Ile Asp Lys Val
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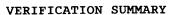
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274 15                   20                  25                 30
276 Arg Thr Gly Val Leu Val Asp Asp Pro Lys Met Lys Lys His Val Leu
277                   35                  40                 45
279 Cys Phe Ser Lys Lys Thr Gly Val Ala Thr Glu Ala Gly Asp Thr Asn
280                   50                  55                 60
282 Val Glu Val Leu Lys Ala Lys Leu Lys His Val Ala Ser Asp Glu Glu
283           65                  70                 75
285 Val Asp Lys Ile Val Gln Lys Cys Val Val Lys Lys Ala Thr Pro Glu
286       80                  85                 90
288 Glu Thr Ala Tyr Asp Thr Phe Lys Cys Ile Tyr Asp Ser Lys Pro Asp
289 95                  100                 105                110
291 Phe Ser Pro Ile Asp
292                   115
295 <210> SEQ ID NO: 8
296 <211> LENGTH: 115
297 <212> TYPE: PRT
298 <213> ORGANISM: Tenebrio molitor
300 <223> OTHER INFORMATION: Mature Protein for Tm 12.84, Clones 2.2, 2.3, and 7.5
302 <400> SEQUENCE: 8
303 Leu Thr Asp Glu Gln Ile Gln Lys Arg Asn Lys Ile Ser Lys Glu Cys
304 1               5                  10                 15
306 Gln Gln Val Ser Gly Val Ser Gln Glu Thr Ile Asp Lys Val Arg Thr
307           20                  25                 30
309 Gly Val Leu Val Asp Asp Pro Lys Met Lys Lys His Val Leu Cys Phe
310           35                  40                 45
312 Ser Lys Lys Thr Gly Val Ala Thr Glu Ala Gly Asp Thr Asn Val Glu
313       50                  55                 60
315 Val Leu Lys Ala Lys Leu Lys His Val Ala Ser Asp Glu Glu Val Asp
316 65                  70                 75                 80
318 Lys Ile Val Gln Lys Cys Val Val Lys Lys Ala Thr Pro Glu Glu Thr
319                   85                  90                 95
321 Ala Tyr Asp Thr Phe Lys Cys Ile Tyr Asp Ser Lys Pro Asp Phe Ser
322                   100                 105                110
324 Pro Ile Asp
325           115
328 <210> SEQ ID NO: 9
329 <211> LENGTH: 481
330 <212> TYPE: DNA
331 <213> ORGANISM: Tenebrio molitor
333 <223> OTHER INFORMATION: Non-His-tagged, Signal plus, Clone 3.4
335 <400> SEQUENCE: 9
336 ggcacgagca aaa atg aaa ctc ctc ttg tgc ttt gct ttc gcc gcc      46
337                 Met Lys Leu Leu Leu Cys Phe Ala Phe Ala Ala
338                             -15                 -10
340 atc gtc atc gga gct cag gct ctc acc gac gaa cag ata cag aaa      91
341 Ile Val Ile Gly Ala Gln Ala Leu Thr Asp Glu Gln Ile Gln Lys
342       -5                  1                 5
344 agg aac aag atc agc aaa gaa tgc cag cag gtg tcc gga gtg tcc     136
345 Arg Asn Lys Ile Ser Lys Glu Cys Gln Gln Val Ser Gly Val Ser
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Use of n and / or Xaa has been detected in the Sequence Listing. Review the Sequence Listing to ensure a corresponding explanation is present in the <220> to <223> fields of each sequence using n or Xaa.

VERIFICATION SUMMARY   DATE: 02/28/2002
PATENT APPLICATION: **US/09/876,796B**   TIME: 12:22:25

Input Set : **A:\Rbl25seq.txt**
Output Set: **N:\CRF3\02282002\I876796B.raw**

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L:10 M:270 C: Current Application Number differs, Replaced Current Application Number
L:11 M:271 C: Current Filing Date differs, Replaced Current Filing Date
L:1880 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1888 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1889 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1912 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1913 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1916 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1920 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:44
L:1934 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1935 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1938 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1939 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1942 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1946 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1950 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1954 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1958 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1962 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1966 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1970 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1974 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:45
L:1989 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:1993 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:1997 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2001 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2005 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2009 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2013 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2017 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2021 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2025 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2029 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:46
L:2044 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2048 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2052 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2056 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2060 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2064 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2068 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2072 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2076 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2080 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2084 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:47
L:2099 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2102 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2105 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2108 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
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VERIFICATION SUMMARY   DATE: 02/28/2002
PATENT APPLICATION: US/09/876,796B TIME: 12:22:25

Input Set : **A:\Rb125seq.txt**
Output Set: **N:\CRF3\02282002\I876796B.raw**

L:2111 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2114 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2117 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48
L:2120 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:48